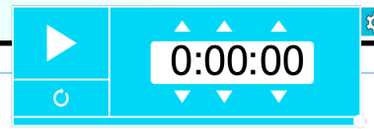
(b)	**(i)**	acceleration *g* of free fall	
	(ii)	techniques and procedures used to determine the acceleration of free fall using trapdoor and electromagnet arrangement or light gates and timer	**PAG1** HSW4, 5, 7 Determining *g* in the laboratory.

(6) M - Take accurate data, plot a graph and calculate a gradient
(7) S - Apply the equations of motion to calculate 'g'
(8) C - Evaluate the limitations and improvements for an experiment



Determining g -Required practical

STARTER: How should we keep a quality and orderly lab book?

HWK (due next lesson): Complete PPQ HWK and glossary

Kilo 10^3

Mega 10^6

Giga 10^9

How must a lab book be kept?

1. Rough and neat work and work completed.
2. Lab book kept in school
3. Keep all practical worksheets in a place in folder
4. Record the name of each practical in the index.
5. Name of practical and date on each page.
6. Include all raw and calculated data in tables.
7. Be clear with headings
8. No loose sheets - stick in or reference in your folder.

(6) M - Take accurate data, plot a graph and calculate a gradient
(7) S - Apply the equations of motion to calculate 'g'
(8) C - Evaluate the limitations and improvements for an experiment

Determining G -Required practical

ACTIVITY: Follow the instructions to find g.

Record all work in your lab book.

HWK (due next lesson): Complete PPQ HWK and glossary

Kilo 10^3

Mega 10^6

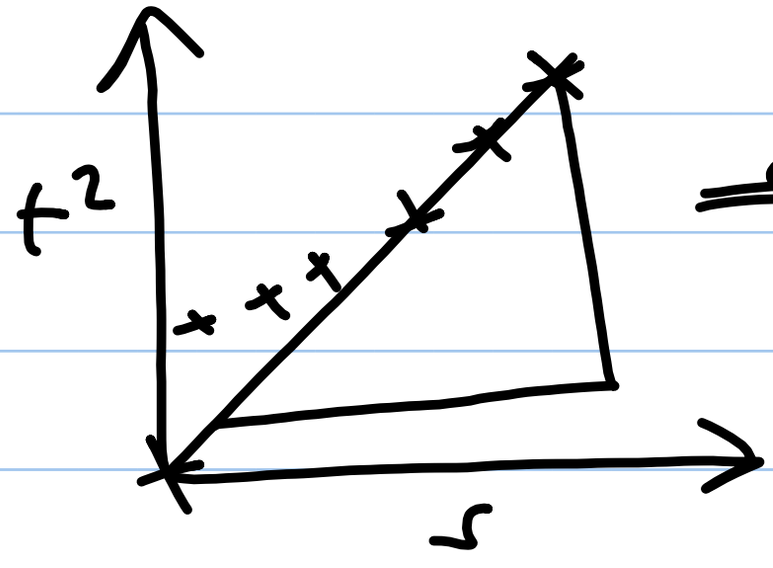
Giga 10^9

$s = ut + \frac{1}{2}at^2$ $\quad s \propto t^2$ $\quad a = g$

$s = \frac{1}{2}gt^2$

$\frac{2s}{g} = t^2$

Key point



$\text{grad} = \frac{dy}{dx} = \frac{t^2}{s}$

$\frac{2}{g} = \frac{t^2}{s}$

Calculation of 'g' – Free Fall Method

Apparatus

Metre rulers
Balls
Stopwatch
Light gate

Method

Drop a ball from a range of heights recording the height dropped and the time taken. Think about what an appropriate range and interval would be.

Results

Plot a graph of ***s*** (y axis) against t^2 (y axis)

2. Calculate the gradient of your line of best fit.

3. Use your value of the gradient to calculate the acceleration due to gravity, ***g***.

Hints/Theory ….

From the equations of motion we have:

$$s = ut + \frac{1}{2}at^2$$

$$s = \frac{1}{2}at^2 \quad s = \frac{1}{2}at^2$$

Where s= height u = initial speed and a= acceleration due to gravity. Since the initial downward speed is zero the equation can be reduced to

You should equate this to the equation of a straight line.

Analysis

Explain the patterns in your data, using relevant knowledge of physics.

Evaluation

Describe two or more limitations of this experiment.

2. Suggest ways to overcome these limitations.

3. For one of the limitations referred to above, state the effect it would have had on your value for ***g***.